



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/529,059

12/14/2005

William Marshall Stark

056646-5024

2559

9629 7590 04/07/2011  
MORGAN LEWIS & BOCKIUS LLP  
1111 PENNSYLVANIA AVENUE NW  
WASHINGTON, DC 20004

EXAMINER

CHOWDHURY, IQBAL HOSSAIN

ART UNIT

PAPER NUMBER

1652

MAIL DATE

DELIVERY MODE

04/07/2011

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/529,059	<b>Applicant(s)</b> STARK ET AL.	
	<b>Examiner</b> IQBAL H. CHOWDHURY	<b>Art Unit</b> 1652	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 November 2010.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 4, 47, 52, 54, 57-59, 67 and 70 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 4, 47, 52, 54, 57-59, 67 and 70 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### **Application Status**

Claims 4, 47, 52, 54, 57-59, 67 and 70 are currently pending in this application.

In response to a previous Office action, a non-final action (mailed on 5/27/2010), Applicants filed an amendment on 11/29/2010, amending claims 4, 52, 57 and 70 that is acknowledged.

Applicants' arguments filed on 11/29/2010, have been fully considered and are deemed persuasive to overcome some of the rejections previously applied. Rejections and/or objections not reiterated from previous office actions are hereby withdrawn.

Claims 4, 47, 52, 54, 57-59, 67 and 70 are under consideration.

### **Claim Rejections - 35 U.S.C. § 112**

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

Claims 52, 54 and 57-59 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite and vague for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 52, 54, 57 and 59 are indefinite and vague as it is unclear how claims 52, 54, 57 and 59 limit claim 70? Since, claim 70 has closed transition phrase regarding mutations at various positions of SEQ ID NO: 2 and thus, claims 52, 54, 57 and 59 do not limit claim 70.

### **Withdrawn-Claim Rejections - 35 USC § 102**

The previous rejection of claims 47, 52, 59, 67 and 70 under 35 U.S.C. 102(b) as being anticipated by Sarkis et al. (A model for the gamma delta resolvase synaptic complex, Mol Cell.

Art Unit: 1652

2001 Sep;8(3): 623-31, see IDS) is withdrawn in view of amendment of claims and applicants persuasive arguments.

### **Withdrawn-Claim Rejections - 35 USC § 103**

The previous rejection of Claim 54 under 35 U.S.C. 103(a) as being unpatentable over Sarkis et al. (A model for the gamma delta resolvase synaptic complex, Mol Cell. 2001 Sep;8(3): 623-31, see IDS) in view of Hughes et al. (Protein-protein interactions directing resolvase site-specific recombination: a structure-function analysis, EMBO J. 1993 Apr;12(4):1447-58) is withdrawn in view of Applicants amendment of claim and persuasive arguments.

### **New-Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 4, 52, 54, 57-59, 67 and 70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sarkis et al. (A model for the gamma delta resolvase synaptic complex, Mol

Art Unit: 1652

Cell. 2001 Sep;8(3): 623-31, see IDS) in view of Hughes et al. (Protein-protein interactions directing resolvase site-specific recombination: a structure-function analysis, EMBO J. 1993 Apr;12(4):1447-58; previously cited), Arnold et al. (Mutants of Tn3 resolvase which do not require accessory binding sites for recombination activity, EMBO J. 1999 Mar 1; 18(5): 1407-14; See IDS), and Pati et al. US PGPUB 2004/0091885, publication 5/13/2004, claim priority of 60/070,734 filed on 12/11/1997; previously cited).

Sarkis et al. teach a mutant serine recombinase Tn3 resolvase comprising a mutation at position G101, wherein the mutation is G101S, and further comprising mutations E102Y, M103I, E124Q and Q105L having greater recombinase efficiency. Sarkis et al. also teach R2 is at interface, which is important for recombinase activity and mutation E56, wherein E56 mutation is E56K. Sarkis et al. do not teach a catalytic domain of serine recombinase comprising mutation at R2A in addition to mutation at G101 (p628, left column, paragraph 4-5, Fig. 6 and right column, paragraph 1) or a kit comprising said modified catalytic domain.

Arnold et al. teach a mutant serine recombinase Tn3 resolvase comprising a catalytic domain and DNA binding domain, a mutation at position G101, wherein the mutation is G101S. Arnold et al. also teach additional mutations including E124Q, D102Y, and M103I. Arnold et al. do not teach a kit comprising said modified catalytic domain of serine recombinase.

Hughes et al. teach mutant of  $\gamma\delta$  resolvase having a mutation R2A, which is at the 2,3-interface (p1451, left column paragraph 2 and Fig 8).

Pati et al. teach a recombinase and a kit comprising said recombinase.

Sarkis et al. clearly teach mutation at position G101S, E56K, E124Q, and D102Y and suggest that catalytic domain of serine recombinase comprises R2 and E56 in the interface.

Art Unit: 1652

Arnold et al. clearly teach a mutant serine recombinase Tn3 resolvase comprising a catalytic domain and a mutation at position G101, wherein the mutation is G101S as well as additional mutations including E124Q, D102Y, and M103I. Hughes et al. teach a specific mutation R2A at the 2,3-interface. Pati et al. clearly teach a kit comprising a recombinase.

Therefore, it would have been obvious to one of ordinary skill in the art as a whole to combine the teachings of Sarkis et al., Arnold et al., Hughes et al., and Pati et al. to make a serine recombinase having only one single mutation at G101S as taught by Sarkis et al. or Arnold et al. as double or triple mutant recombinase protein or a mutant recombinase or catalytic domain consisting of G101S, R2A, E56K, D102Y, M103I, Q105L because Sarkis et al. clearly teach serine recombinase or catalytic domain having mutations at position G101S, D102Y, M103I, E124Q and E56K, and furthermore, Sarkis et al. suggested that R2 is at interface and Hughes et al. clearly teach a recombinase having a mutation at position R2A to make modified serine recombinase or catalytic domain in any combination of the recited positions from the teachings of Sarkis et al. Arnold et al., Hughes et al. to arrive the claim invention. It would have been also obvious to put modified serine recombinase or catalytic domain of Sarkis et al., Arnold et al., or Hughes et al. in a kit for commercial purpose.

One of ordinary skill in the art would have been motivated to make a mutation at position R2A and E56K in addition to G101S, D102Y, M103I, E124Q and E56K because R2A resides in 2,3-interface, which is important for binding to the DNA.

One of ordinary skill in the art would have a reasonable expectation of success because Sarkis et al., Arnold et al., and Hughes et al. have successfully made modified recombinase or catalytic domain at various positions as claimed.

Art Unit: 1652

Therefore, the above references render the prima facie obvious to one of ordinary skill in the art.

### **Conclusion**

#### **Status of the claims:**

Claims 4, 47, 52, 54, 57-59, 67 and 70 are rejected.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Iqbal Chowdhury whose telephone number is 571-272-8137. The examiner can normally be reached on 9:00-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Mondesi, can be reached on 571-272-0956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Iqbal Chowdhury, Patent Examiner  
Art Unit 1652 (Recombinant Enzymes)  
US Patent and Trademark Office  
Rm. REM 2B69, Mail Box. 2C70  
Ph. (571)-272-8137, Fax. (571)-273-8137

/ANAND U DESAI/  
Primary Examiner, Art Unit 1656  
April 6, 2011